Operational CA based agronomic package for sustainable production of irrigated wheat

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Introduction

Having a holistic view on irrigated wheat production in the context of CA but with the local adopted managed approaches would be a necessity for the future sustainable intensification of crop production. Non-efficient ways utilizing environmental resources, down trend in quantity and quality and more dependence to the farming inputs are of the main problems. We should develop CA based diversified sequential cropping systems as practical combination of production system components, internally and systematically related, to simultaneously observe its positive economic future effects, reduce dependence to the external resources and consumptive inputs and activate biological buffers of the production environment. Thus, providing and developing agronomic packages for this condition including cultural practices pre-defined and in detail would be so much important for the soil health providing our healthy food.

Methods & materials

In order to complete the agronomic package for the sustainable intensification of irrigated wheat some separated but in the context of CA vs. conventional managements were done on many aspects such as seeding machineries, seeding date, density and sowing pattern, seed bed preparation and planting geometry, macro and micronutrients effects and their efficiency, irrigation regimes, residue management, no-till vs. minimum tillage, raised bed planting, genotype responses to the managements and systems, etc. in nearly two decades past. The 1st priority here was the realities, limitations and opportunities.

Figure 1. Irrigated wheat lands managed by the sustainable agronomic package

Results & conclusions

The agronomic managed approaches as forwarding continuous steps are as follow: 1- Discarding moldboard plow and tilling the soil just with the disk and considering its gradual diminishing tillage depth trend of 30 to 15 Cm through the next years (Non-inversion vertical shallow tillage). 2- making raised beds with the fixed width of 0.75 Cm for all the crops in the sequential cropping system. 3- Consideration of the irrigated wheat/berseem clover-canola/maize as the best recommended two years four crops sequential cropping system for the irrigated wheat based cropping systems of the temperate-cold climate of Karaj, Iran all seeded with the conventional but not no-till seeder. 4- Irrigating properly levelled land with crop on beds made or shaped as a furrow irrigated raised bed planting system. 5-Applicability of mechanized fertilizer side-dress banded application for all the crops incorporated in the recommended cropping system. 6- Feasibility of integrated weed management including mechanical, cultural and chemical weed control throughout the cropping system. 7- Field access of the machinery for chemical weed control in two phases of general off-season and main crop(s) specific weed control. 8- No compilation of the crop residues on the soil surface to lessen its negative effects on proper seedbed preparation and seeding thus conserving part of the crop residue on the soil surface (15-30%) but moving its large part into the soil with the economic yield benefits for all the crops of the cropping system and feasibility of an economic sequential diversified cropping system conservation agriculture based applicable for the irrigated wheat lands managed with furrow irrigation and potentially upgradeable for the near future modifications for the drought and less favorable production environments especially in small scale farmlands.